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ABSTRACT

The purpose of this study was to determine whether graphic organizers serve as a better tool for comprehension assessment than traditional tests. Subjects, 16 seventh-grade learning disabled students, were given 8 weeks of instruction and assessments using both graphic organizer and linear note forms. Tests were graded, compared and contrasted to determine if one form of assessment was better than the other. An ANOVA revealed no significant difference between the forms of assessment. This finding was inconsistent with prior research conducted with middle school students. Possible explanations for this finding are discussed. Topics addressed in the paper include reading comprehension, content-area reading skills, conceptual understanding, and vocabulary instruction in the classroom. Contains 4 unnumbered tables of data and 94 references. (Author/RS)

Enhancing Comprehension Through Graphic Organizers

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in Reading Specialization

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ABSTRACT

The purpose of this study was to determine whether graphic organizers serve as a better tool for comprehension assessment than traditional tests. Sixteen seventh grade learning disabled students were given 8 weeks of instruction and assessments using both graphic organizer and linear note forms. Tests were graded, compared and contrasted to determine if one form of assessment was better than the other. An ANOVA revealed no significant difference between the forms of assessment. This finding was inconsistent with prior research conducted with middle school students. Possible explanations for this finding are discussed.

ENHANCING COMPREHENSION THROUGH GRAPHIC ORGANIZERS

Research has proven that certain learning strategies appear to provide readers with a procedure for successfully extracting, remembering, and retrieving information from written and verbally relayed material (Holley & Dansereau, 1984, as cited in Griffin & Malone, 1995). One such learning strategy that has received much attention by both researchers and practitioners is the use of graphic organizers (Griffin & Malone, 1995). Graphic organizers are visual representations of how ideas are related to each other. These "pictures", including Venn diagrams, flow charts, attribute webs, etc., help students collect information, make interpretations, solve problems, devise plans, and become aware of how they think (Green, 2000). They are intended to be used to organize information in a manner that makes it easier to understand and learn. Theoretically, graphic organizers help students learn by consolidating information into a meaningful whole so that they see that what is being taught is not a set of unrelated facts, terms, and concepts (Horton, Lovitt, & Bergerund, 1990, as cited in Fisher & Schumaker, 1995). Graphic organizers are flexible instructional tools used to improve students' comprehension of stories, organization of their own written stories, and understanding of difficult concepts (Fisher & Schumaker, 1995). In addition, these visual construction devices help students to see how major ideas are related to their own prior knowledge. They also help students to make a conscious effort to identify key concepts in new knowledge, and relate them to concepts in their existing knowledge structures (Kinchin, 2000).

HISTORY OF GRAPHIC ORGANIZERS

The graphic organizer, originally called a structured overview, was developed as an attempt to translate Ausubel's (1968, as cited in Griffin & Malone, 1995) cognitive theory of meaningful reception learning into practice. Ausubel argued that an individual's existing knowledge or cognitive structure is a major variable in learning new material in a content area. Thus, he hypothesized that new meanings are acquired only when they are related to previously learned information. Further, new learning will be enhanced if the existing information is clearly and concisely organized. Accordingly, Ausubel argued that learning and retention could be facilitated by strengthening components of a learner's existing cognitive structure (Griffin & Malone, 1995). Therefore, he advocated the use of structured overviews that provide learners with a structure of superordinate concepts. Learners presumably could encode more new information within the schema provided by the organizer than they could without the organizer (Hall & Hall, 1999). Ausubel (1968, as cited in Griffin & Malone, 1995) promoted the use of the overviews as a way for teachers to strengthen students' existing cognitive structure with classroom learning tasks. Ausubel stated that they "provide ideational scaffolding for the stable incorporation of the more differentiated material in the learning passage" and "increase the discriminability between the new material and similar or conflicting ideas in cognitive structure" (pg. 148).

Researchers such as Barron (1969, as cited in Merkley & Jeffries, 2000) and Earle (1969, as cited in Merkley & Jeffries) continued investigating the use of structured overviews. As practitioners and researchers expanded the application of these structured outlines to include a hierarchically organized visual display of information, they adapted

structured frameworks for prereading, during-reading, and postreading tasks, and the term "structured overview" was replaced with the term "graphic organizer" (Dunston, 1992; Griffin, Simmons, & Kameenui, 1991, as cited in Merkley & Jeffries, 2000).

Currently, as the population and needs of students grow more diverse, there is a great need for visual tools to be used as additional, augmentative tools for effective teaching intervention. Presently, there are many "mind maps" that are designed to be used with the flexibility and versatility. They can be used with groups or individual students to complement existing procedures for teaching English, Language Arts, Social Studies, and other academic subjects (Wiig & Wilson, 1998). Today, graphic organizers are also called semantic maps, mind maps, webs, concept maps, and semantic organizers. The schema of the organizer can be hierarchical, conceptual, sequential, or cyclical (Green, 2001).

THE IMPORTANCE AND PURPOSE OF GRAPHIC ORGANIZERS

Enhancing students' abilities continues to be one of education's fundamental purposes. However, teachers face numerous barriers as they attempt to achieve this goal. One of the major ways to overcome this barrier is to integrate visualization into the curriculum (Supon, 1998). It is through visualizing important concepts and facts that students can build knowledge bases. Visualizing, according to Miles (1994, as cited in Supon, 1998), means "creating mental pictures to aid in learning, thinking, and solving" (p. 50). When concepts are organized and visual, students can begin to sharpen their abilities to communicate the information (Hyerle, 1996, as cited in Supon, 1998). When teachers oppose the traditional method of lecturing and integrate visuals and visualizing

into the class on a regular basis, they have penetrated another barrier. Integrating and exercising visualization results in student enthusiasm and interest (Freseman, 1990, as cited in Supon, 1998).

Memory plays an important part in the teaching/learning process. As noted by Caine and Caine (1997, as cited in Banikowski, 1999), "Many of us associate the word memory with the recall of specific dates or facts or lists of information and sets of instructions, requiring memorization and effort" (p. 41). However, memory goes beyond the one-dimensional aspect of learning, and rather, focuses on attending, learning, linking, remembering, and using the inordinate amount of pieces of knowledge and skills we encounter constantly (Banikowski, 1999). Among the strategies that enhance memory through active learning are graphic organizers. They concretely represent abstract or implicit information, show relationships, help to organize ideas, help to relate new information with prior knowledge, and assist in the storage and retrieval of information. They are effective in helping learners construct meaning by visually representing the meaning they construct from reading or listening (Heimlich & Pittelman, 1986; Pehrsson & Robinson, 1985, as cited in Banikowski, 1999).

Graphic organizers allow teachers and students to translate ideas and concepts into a visual, graphic array, creating a blueprint plan for organizing an assignment and/or concept. When teachers construct a visual plan and students contribute content knowledge that becomes words and terms in an array of the visual play, teachers help students remember and categorize information (Guastello, 2000). Graphic organizers allow active learning, as students are connecting visual language with verbal language.

In addition, graphic organizers can be used to generate ideas, to brainstorm, to design structures, to aid learning and comprehension by integrating new and old knowledge, and to assess understanding or diagnose misunderstanding (Green, 2000; Plotnick, 1997).

Visual representation has several advantages. Visual symbols are quickly and easily recognized. Secondly, minimum use of text makes it easy to scan for a word, phrase, or the general idea. Focusing on important concepts and omitting extraneous details helps the student see how concepts are related and makes them more easily understood. In addition, since the human mind stores information in an orderly fashion, new information is more easily assimilated (Green, 2000; Plotnick, 1997).

Another advantage that comes along with incorporating graphic organizers in the classroom is the ability to detect "misconceptions" and eliminate them. To promote meaningful learning, ways must be found to eliminate or prevent misconceptions, which are ideas that students come to class with that are incorrect, or inconsistent with what is being taught (Sungur, Tekkaya, & Geban, 2001). Ideas students may have are often incomplete and deficient leading to misunderstanding of instruction. Concept maps drawn by students express their conceptions, or rather misconceptions, and can help the teacher diagnose the misconceptions that make instruction ineffective (Ross & Munby, 1991, as cited in Plotnick, 1997). Concept mapping can make such a significant contribution to a student's understanding and comprehension that a long time misconception that they had can be clarified and eliminated. This shows that it is not easy to eliminate misconceptions just by employing traditional instructional methods (Sungur et al., 2001).

APPLICATIONS AND USES OF GRAPHIC ORGANIZERS

Three explosions are simultaneously vibrating through schools' classrooms. First, there is an explosion of content information being taught to the students. Secondly, there is an increased emphasis on student learning outcomes. Third, there is the growing number of students with learning and attention difficulties who struggle with grasping and retaining new concepts. Employing a variety or graphic organizers such as charts, diagrams, map and webs are examples of visual displays that are useful for facilitating learning and memory (Fulk, 2000). Creation of the above forces students to review and manipulate learned information (Kinchin, 2000).

Graphic organizers can be used for assessment. Once students have used graphic organizers with a piece of literature or unit of study, their mastery of that use can be tested by asking students to use the graphic organizer on new material. Student knowledge and their approach to literature can be tested by asking them to apply a new or different graphic organizer with the literature just completed (Green, 2000).

Graphic organizers can also be used as a pre-teaching or post-teaching strategy for the purpose of introducing or reinforcing the key concepts and/or main ideas and how they might be related (Tierney, Readence, & Dishner, 1985, as cited in Hill, 1994).

The use of organizers may also be of value in guiding students through text, signposting key concepts, and showing connections between them, helping to gauge understanding. It is thought to be more effective than other reading strategies because it requires students to process text at a deeper level than they would if they were just underlining (Amer, 1994, as cited in Kinchin, 2000).

Mapping used as a whole-class teaching procedure of textual material may assist students to build schemata for understanding a lesson's concepts. While using the textbook and simultaneously building the connections, students are actively engaged in analyzing text. They have to process the text deeply, which is generally referred to as comprehension (Guastello, 2000). Mapping can also move reading from a passive experience toward one that is more active and requires the student to manipulate or transform the material to be read (Kinchin, 2000).

In addition, graphic organizers can be used as a creativity tool. As one puts ideas down on paper, the ideas become clearer and the mind becomes free to receive new ideas which may be linked to ideas already on the paper, which may trigger new associations leading to new ideas (Plotnick, 1997).

DESIGNING GRAPHIC ORGANIZERS

Graphic organizers should be "well-organized", with clear connections being made of which are aware (Iding, 2000). Wiegmann, Dansereau, McCagg, Rewey, and Pitre (1992, as cited in Iding, 2000) found that performance was better with "well-organized" than with "poorly-organized" graphic organizers. Spatial proximity, how close or how far apart elements are placed, is a critical graphic design element of spatial arrangement. According to the proximity compatibility principle (Barnett & Wickens, 1988, as cited in Iding, 2000), closely related ideas are more easily integrated by the learner if they are placed in close visual proximity; conversely, distantly related ideas are more easily individuated by the learner if they are placed at a distance (Iding, 2000).

Suggestions for creating graphic organizers usually include the following steps: Analyze the learning task for words and concepts important for the students to understand. Then, arrange them to illustrate the interrelationships and patterns of organization. Next, evaluate the clarity of relationships as well as the simplicity and effectiveness of the visual. Lastly, substitute empty slots for certain words in order to promote students' active reading (Merkley & Jefferies, 2000).

CORRECTLY IMPLEMENTING GRAPHIC ORGANIZERS IN THE CLASSROOM: TEACHERS TEACHING, THEN STUDENTS CREATING ON THEIR OWN

Teachers must guide the students and teach them how to properly use a graphic organizer when it is initially utilized in the classroom. By keeping the organizer visible during the entire time and constantly referring to the organizer, the students become more aware of what information is considered necessary for the organizer and how to correctly utilize it (Hill, 1994).

In teaching students how to use and independently implement graphic organizers, the educator should discuss the benefits, introduce the purpose and specific form, apply the organizer to familiar and then new material, and allow students an opportunity to reflect on use of the graphic organizer. Once mastered, many opportunities should be provided for students to independently select the appropriate graphic organizer, matching the organizer selected to the learning need (Banikowski, 1999).

Opportunity for student input should be provided. With frequent pauses for student input, the teacher can use the graphic organizer's elements for brief, focused

discussions. The teacher can encourage the student comments about the graphic organizer elements to see what the students already know about which elements and to assess relationships the students comprehend. The teacher's questions should be open ended, avoiding yes or no responses and inviting the opportunity for the students' translation of the material being taught (Merkley & Jefferies, 2000). The longer the students are "trained" in using graphic organizers, the better they are able to accommodate the large amounts of information being given to them next time they are presented with an assignment using a graphic organizer (Griffin & Malone, 1995).

Research suggests that using visual organizers adds to teaching effectiveness and that use of such instructional tools facilitates greater comprehension in a supportive manner (Yates & Yates, 1990). However, for students to take ownership of this mapping strategy and other interactive thinking strategies, teachers need to gradually reduce the instructional support (Pearson, & Gallagher, 1983). Having completed a few model mapping lessons, the teacher can plan for the next level of text/mapping/thinking interaction. At this point, students should have opportunities to construct their own graphic organizers (Banikowski, 1999).

At this level, students are practicing the strategy of utilizing graphic organizers basically on their own, with teacher guidance (Sinatra, 2000). When students prepare their own maps, it allows them to think in multiple directions, to externalize all the relationships formed in their cognitive structure, and learn the concepts meaningfully (Sunger et al., 2001). It also allows more intense student involvement in the learning

process. The organizer will become more personalized and less abstract when they are able to create it on their own (Hill, 1994).

SETTING THE STAGE FOR COMPREHENSION: USING GRAPHIC ORGANIZERS TO RELATE OLD KNOWLEDGE TO NEW KNOWLEDGE

Students interact with text in different ways because of the different experiences and prior knowledge they bring with them. Students' ability to activate prior knowledge regarding content-area topics depends on word knowledge and experience with a wide variety of reading materials. Limited experience affects reading comprehension because prior knowledge plays an important role in helping students understand higher-level concepts (Snider, 1989). Whenever new information fails to interact with previously presented information, it is considered difficult. Graphic organizers serve as an excellent technique for examining difficult material and linking it to previously learned material (Grinols, 1988, as cited in Hill, 1994). When students lack background information on a topic, to aid comprehension, the active participation in constructing semantic or concept maps may help students form a cognitive schema to assimilate and relate the new topic information (Guastello, 2000).

Teachers should present a graphic organizer and use the visual to aid the discussion to ensure that an adequate amount of prior knowledge is present. Using this as a prereading strategy, prereading questions can be addressed and it will help prepare students for reading (French & Landretti, 1995, as cited in Ostoits, 1999).

It is widely perceived that prior knowledge is a key factor that influences learning and comprehension, as summarized by Clifton and Slowiaczek (1981, as cited in

Kinchin, 2000): "Our ability to understand and remember new information critically depends upon what we already know and how our knowledge is organized." (p. 4) Ausubel recommended the use of introductory materials that support learning by activating relevant existing knowledge, thus preparing the way for more effective learning by making the students and teachers aware of what they already know in a given area (Kinchin, 2000).

ENHANCING COMPREHENSION THROUGH USE OF GRAPHIC ORGANIZERS

Reading comprehension refers to the act of thinking and constructing meaning before, during, and after reading by integrating information from the author with the reader's background knowledge (Snider, 1989). The ability to activate one's prior knowledge about a topic, self-question, identify main ideas and supporting details, paraphrase, and summarize are critical skills of effective comprehension development (Bryant et al., 1999). Thus, the development and use of effective strategies before, during, and after the reading process to foster reading comprehension skills is one of the most significant goals of educators (Mastropieri & Scruggs, 1997; Pressley, Brown, El-Dinary, & Afflerbach, 1995, as cited in Bryant et al., 1999).

While 20 years ago research on the reading comprehension problems of students focused on difficulties with decoding text, researchers today view such problems as arising from difficulties across a wide range of language and thinking activities (Swanson & Hoskyn, 1998). They recognize that some students have mastered the mechanics of

reading but still have comprehension problems. This type of problem may not be evident until the higher grades when comprehension challenges increase (Williams, 2000).

The main idea underlying successful comprehension is that in order to understand anything we must be able to know something about that text. We take information we already know and use strategies that help us search for memories to find something that connects it to an experience, an idea, or good feeling (Glazer, 2000). We must realize too, that the fewer connections to text students make, the poorer the comprehension. We can't teach students to comprehend by explaining how to do something or what something means. We can only prompt them to ask themselves the right questions that guide them to search for appropriate information (Glazer, 2000).

All students are capable of comprehending any written text, to some degree, provided they have been afforded exposure to several concept-extraction methods. Noteworthy among these are graphic organizers (Hill, 1994). Graphic organizers are essentially graphic representations of text structures. Such idealized plans help students form mental constructs or schemata of how texts are organized. Because they portray model plans of text structure, students formulate mental plans of comprehending as they read (Sinatra, 2000).

During the process of reading, students can complete organizational frameworks to facilitate their understanding of the text and improve their ability to deal with information presented in various expository text structures (Lovitt & Horton, 1987, as cited in Bryant, Ugel, Thompson, & Hamff, 1999). Organizational frameworks enable students to arrange information from the text in order to facilitate comprehension and

retention. For example, frameworks can be developed for comparing and contrasting information or for displaying a cause-effect relationship (Griffin & Malone, 1995).

Research has reported that students with and without learning difficulties have improved in reading comprehension when they have been shown how textbook ideas are organized and when they have been provided visual models of text organization (Englert, Raphael, Anderson, Anthony, & Stevens, 1991; Raphael, Engler, & Kirschner, 1986; Richgels, McGee, Lomax, & Sheard, 1987; Wong, 1997, as cited in Guastello, 2000). These researchers used differing methodologies and graphic organizers to help students process and understand content texts. For instance, sixth-grade students used an organizer called a "think sheet" to recall, organize, and synthesize what they read in content subjects (Raphael, Englert, & Kirschner, 1985, as cited in Guastello, 2000).

In another study where one group read and discussed the text, and the other group read, discussed and created a concept map containing major and minor concepts presented in the text, the group of seventh graders presented with the concept map performed significantly better than those who did not create an organizer (Guastello, 2000). Relatedly, research on graphic organizers by Alvermann and Boothby (1986, as cited in Merkley & Jefferies, 2000) suggested that the effects upon comprehension are increased when graphic organizers are partially constructed by students as a during-reading or postreading activity.

Students report feelings of frustration, anger, and sadness about their inability to understand what they read. What they lack is comprehension monitoring and the ability to recognize when reading comprehension breaks down, and draw from a repertoire of

comprehension strategies to move beyond the problem (Rose, 2000). Graphic organizers are one of the more successful tools that help students monitor their comprehension, allowing them to obtain a clearer picture of what they are reading.

APPLYING GRAPHIC ORGANIZERS IN THE CONTENT AREAS TO AID IN COMPREHENSION OF TEXT

Students in middle and high school grades need assistance in content-area reading to integrate new information with their prior knowledge, to obtain important information from the text, and to remember what they have read. Thus, content area reading instruction and text comprehension are important components of secondary curricula and includes strategy instruction in word identification, vocabulary, and comprehension skills (Bryant et al., 1999).

Raphael and Englert (1989, as cited in Guastello, 2000) reported that when students reach the upper grades their progress in comprehension declines as the emphasis on learning content increases. These researchers attribute the decline to the fact that students may not have received explicit instruction in reading and organizing information from content-area texts (Guastello, 2000).

The question of "How can reading in the content areas be taught effectively in the middle school?" has been raised. To address this question, certain elements for instruction were examined. Students need to be taught strategies for activating prior knowledge, and they need to understand how they learn and be taught various study strategies, such as detecting organizational patterns and using graphic organizers (Loranger, 1999).

Middle school teachers can promote higher thinking in all content area subjects. By making a conscious commitment, teachers can expect to develop brand new repertoires of competencies and instructional motes. By integrating visuals in various forms in the curriculum, teachers allow images to become connections to related content (Supon, 1998).

Content-area reading means that students interact with text to interpret and construct meaning before, during, and after reading by using their prior knowledge and the skills and strategies developed during early reading instruction (Bryant et al., 1999). Textbook-based instruction is based on the assumption that students can read and derive meaning from the text. Typical middle school academic instruction involves teachers providing lectures on textbook content and students reading their textbooks to identify important facts and concepts in preparation for weekly tests (Kinder & Bursuck, 1991). This is particularly daunting for students with reading disabilities, and for students who have weak comprehension, who have not mastered early reading skills, and who must cope with academic activities that are literacy-based (Bryant et al., 1999).

All secondary teachers, no matter what their content areas are, must incorporate the teaching of reading comprehension strategies into their regular curriculum (Rose, 2000). Graphic organizers have been found to be an effective tool for organizing information across the curriculum so that it can be understood and recalled later. Spatial displays are being used more frequently as supplements to and substitutes for text presentation of information (Wallace & West, 1998).

UTILIZING GRAPHIC ORGANIZERS TO COMPREHEND EXPOSITORY TEXT

The comprehension of expository text is more difficult for almost all students. Exposition usually deals with less familiar content and involves more complex and varied structures (Williams, 2000). Expository text written with the primary intent of communicating information, facts, and ideas, presents a challenge for students because it includes text structures that are often different from those students have encountered in narrative material (May, 1990; McCormick, 1995). Organization and retention of expository text can be aided by graphic organizers and visuospatial arrangements of information to show the interrelationships among ideas (Bryant et al., 1999). Spatial learning strategies appear to provide readers with a procedure for successfully extracting, remembering, retrieving, and comprehending information from one of the most difficult reading situations encountered in schools: an expository, academic textbook (Holley & Dansereay, 1984, as cited in Griffin & Malone, 1995). One such spatial learning strategy that has received much attention by both researchers and practitioners is the use of graphic organizers (Griffin et al., 1995).

The graphic organizer strategy offers considerable potential to enhance students' comprehension of expository text. Thoughtful construction of the visual reflects how the teacher chooses to emphasize the important concepts in a selection (Merkley & Jefferies, 2000). Visual structures that provide a visual representation of the content of expository text helps students better comprehend important text ideas and how they are related. The information from a visual structure also aids summarization and allows for use of

multiple modalities (Dowhower, 1999). In addition, as a summarizing tool, large amounts of information can be condensed, eliminating the presentation of extraordinary amounts of information to comprehend (Kinchin, 2000).

Textbooks are the predominant teaching tool used to teach in content areas. Numerous studies report 75% to 90% of classroom instruction is organized around textbooks (Tyson & Woodward, 1989, as cited in Crawford & Carnine, 2000). Despite this fact, current textbooks have been criticized for their poor organization. Students become overwhelmed with the quantity of material to be learned. Graphic organizers have been recommended for textbooks in order to foster comprehension of material (Crawford & Carnine, 2000). The use of graphic organizers "not only facilitates initial attainment of the concepts, but subsequent retention and retrieval of information" (Carnine, Silbert, & Kameenui, 1997, p. 297, as cited in Crawford & Carnine, 2000).

ENHANCING COMPREHENSION THROUGH VOCABULARY BY WAY OF GRAPHIC ORGANIZERS

Although the use of context and the use of definitions are widely accepted as methods for helping students learn new words, neither method is sufficient for developing the relational knowledge necessary for in-depth understanding of concepts (Blachowicz & Fisher, 1996, as cited in Misulis, 1999; Irvin, 1990, as cited in Fisher & Schumaker, 1995). To develop conceptual understanding, vocabulary instruction should involve students in deep processing of words. Effective use of graphic organizers appears to meet these conditions exceptionally well (Monroe, 1998).

> Key vocabulary terms or concepts from a learning task that are graphically displayed can activate prior knowledge more instantaneously and completely than abstract prose ...Graphic organizers...organize information to be learned, connect it to what is known, and allow the reader to interact with the text (Dunston, 1992, as cited in Merkley & Jefferies, 2000 p. 59).

To promote comprehension, students need to develop an understanding of how words can be used across different contexts and be able to understand the meaning of words quickly while reading. Students benefit from knowing the meaning of words, the relationship of words, and the contextual interpretations (Baumann & Kameenui, 1991, as cited in Bryant et al., 1999). Thus, the goal of vocabulary instruction is to help students develop and apply vocabulary knowledge across a variety of contexts and to increase the repertoire of strategies for figuring out new vocabulary independently (Bryant et al., 1999).

Vocabulary instruction has the greatest effect on comprehension when students are engaged in different activities including, but not limited to, defining the words and using the words in context (Stahl, 1986). Effective vocabulary instruction consists of providing numerous encounters with words, concepts, discussions, and opportunities to use these words and concepts across a variety of contexts (Beck & McKeown, 1991, as cited in Bryant et al., 1999). Moreover, vocabulary instruction focuses on teaching words independently in context (Baumann & Kameenui, 1991, as cited in Bryant et al., 1999). Some suggestions to address the above are as follows: Present new vocabulary in semantically related groups (Nagy, 1998, as cited in Bryant et al., 1999), have students

link new vocabulary with their background knowledge (Beck & McKoewn, 1991, as cited in Bryant et al., 1999), and provide multiple exposures to words across contexts (Stahl, 1986).

In order for words to be truly learned, that is, to be used and committed to long-term memory, they must be reinforced many times in meaningful ways. Helping students to make associations among the vocabulary words using graphic organizers helps them to better understand the meaning of words in relation to other words and the interrelationships among words (Blachowicz & Fisher, 1996; Misulis, 1999). Graphic organizers have been found to be especially effective for teaching technical vocabulary (Rose, 2000). Because graphic organizers have been found to be an effective strategy for vocabulary instruction in informational text, one might infer their usefulness in teaching content area vocabulary in subjects such as math, an area where vocabulary knowledge seems extremely weak and hard to address (Monroe, 1998).

Secondary students acquire about 3,000 new words per year as they read numerous materials as part of content-area and independent reading. By the time most students graduate from high school, they will have encountered more than 88,500 word families. Clearly, vocabulary knowledge is acquired rapidly during the school years; however, research has shown that the rate at which students acquire vocabulary varies, which in turn affects their ability to comprehend written materials (Carnine, Silbert & Kameenui, 1998, as cited in Guastello, 2000).

Enhancing vocabulary through graphic organizers works well with both groups and individuals. Seaman (1990, as cited in Guastello, 2000) found in a study conducted

with both individuals and groups using graphic organizers, that both sets performed better than groups and individuals who didn't use graphic organizers on weekly vocabulary tests.

Stahl (1986) identified three increasingly deep levels of processing vocabulary knowledge. The first level entails students linking their understanding of the new word to a synonym or specific context. The second level is where students apply associative knowledge of the word. Lastly, the third level involves students using their knowledge of the word to the extent of interacting with the words, building it into their own comprehension, and using it to process the text surrounding it. Through all three of these levels, graphic organizers can serve as an aide to students, leading to clearer, better, and more concise comprehension (Bryant, et al., 1999; Stahl, 1986).

Hawke's research (1986, as cited in Merkley & Jefferies, 2000) favors the use of graphic organizers because it provides an overview of material that is to be learned, serves as a reference point for putting new vocabulary and main ideas into orderly patterns, is a cue for important information, and is a visual stimulus for written and verbal information.

UTILIZING GRAPHIC ORGANIZERS DURING NOTE TAKING TO ENHANCE COMPREHENSION

There appears to be advantages for graphically organized notes versus outlined notes (Katayama & Robinson, 2000). When students are required to become actively involved in generating some of the information they will study later, the information seems to have more meaning than if the notes are merely provided for them to study.

Actively generating notes results in better text comprehension (Katayama & Robinson, 2000). Note-taking serves two important functions: encoding and external storage (DiVest & Gray, 1972; Hartley, 1983; Kiewra, 1989, as cited in Katayama & Robinson, 2000). The encoding function posits that the activity of taking notes leads to better test performance than not taking notes. The external storage function posits that reviewing notes is better than not reviewing notes. This seems like a simple concept, however it is not carried out as easily due to the fact that students are generally poor note-takers (Katayma & Robinson, 2000). The most effective kinds of notes that have emerged from the research literature have used spatial, rather than linear formats (Katayama & Robinson, 2000).

Most students take notes in an outline format (Robinson & Kiewra, 1995, as cited in Katayama & Robinson, 2000). Simply providing students with complete outline notes has not been proven to be the best instructional strategy. The most effective kinds of complete notes that have emerged from the research literature have used a spatial, rather than linear, outline type, format (Katayama & Robinson, 2000).

In several recent studies, researchers have examined the instructional advantage of providing graphic organizers, rather than outlines, to students. Robinson and Schraw (1994, as cited in Robinson & Katayama, 1998) asked students to read a short text and then study either the same text, an outline, or a graphic organizer. The students who studied the graphic organizer learned more concept relations. Robinson and Schraw hypothesized that computing concept relations requires more effort when studying outlines and texts than when studying graphic organizers. Robinson and Skinner (1996,

as cited in Robinson & Katayama, 1998) found that when students searched graphic organizers for answers to comprehension questions, they found information needed to answer questions faster than when they searched outlines or texts. Those results provide additional evidence that graphic organizers are computationally more efficient than outlines or texts, facilitating both local, searching for concept facts, and global, searching for concept relations and patterns among concept attributes, search tasks. Thus, one possible explanation for why graphic organizers facilitate learning of concept relations is that they are mentally stored in an efficient, spatial format that can be easily searched for information (Robinson & Katayama 1998).

Another reason why graphic organizers may be better than linear displays such as outlines and lists is that they are stored in memory in a more spatial format, therefore being stored in both spatial and verbal formats as opposed to just verbal formats (Robinson, Katayama & Fan, 1996; Robinson, Robinson, & Katayama, 1999). Therefore, students are providing themselves with an additional retrieval path for recalling the information. That conjoint, verbal and spatial, retention of text information facilitates recall because two routes are better than one (Robinson, Katayama, & Fan, 1996).

USING GRAPHIC ORGANIZERS TO STUDY AND REVIEW CONCEPTS AND TEXT IN ORDER TO ENHANCE COMPREHENSION

In an experiment, the effects of study materials, text alone vs. text plus outlines vs. text plus graphic organizers, on students' application of concepts were studied. The students who viewed text plus graphic organizers were more likely to report using

nonmemorization study strategies that those who didn't (Robinson & Katayama, 1998, as cited in Katayama & Robinson, 2000). Therefore, this proves that by studying graphic organizers, students were committing information to a long term, applicable memory, as opposed to just strictly memorizing information for the purpose of taking a test.

In another study, Horton, Lovitt, & Bergerud (1990, as cited in Fisher & Schumaker, 1995) found that students received significantly higher quiz scores when they completed graphic organizers compared to when they did self-study.
When students use organizers as a tool for studying, there is evidence that an effort has been made. Rereading doesn't provide evidence that an effort has been made, yet when an organizer is shown, the teacher is able to get more information about the performance of the student. Discrepancies then found between the test score and the concept map quality might also highlight the relationship between effort and achievement (Kinchin, 2000).

Studying graphic organizers are considered spatial visualization rather than associational learning. As stated previously, recent evidence suggests that graphic organizers may be stored in memory in a more spatial format than are outlines and texts (Robinson et al., 1996, 1998). If that is the case, it is safe to infer that delayed review may be more beneficial for studying graphic organizers than linear displays such as outlines (Robinson & Kataymam, 1998).

In a study conducted by Crawford & Carnine (2000), results showed that students using graphic organizers acquired more content knowledge than students who studied from the text, even on a test drawn from text materials. These finding suggest that

materials which help to more clearly communicate the organizing principles in the "big ideas" do in fact help students to acquire more knowledge of text material, therefore comprehending more.

USING GRAPHIC ORGANIZERS WITH THE SPECIAL EDUCATION POPULATION

Students with learning disabilities experience significant problems in reading. In fact, a primary reason for their referral to special education is deficient reading skills (Bryan, Bay, Lopez-Reyna & Donahue, 1991, as cited in Gardill & Jitendra, 1999; Lloyd, Kauffman, Landrum, & Roe, 1991). Reading comprehension is a critical aspect of reading. By incorporating graphic organizers such as story maps into the lesson, comprehension can be increased in learning disabled students. Results from a study showed that when using a story map with middle school students with learning disabilities, their comprehension increased (Gardill & Jitendra, 1999).

When learning disabled students, more than nonclassified students, are presented with a textbook-centered approach, with lectures, reading, worksheets, and questions for homework, the outcome is a less than desirable result. Researchers have consistently demonstrated that poor readers do not acquire strategic reading behaviors by themselves. They need to be given a strategy to help construct meaning as they interact with new material. One proven strategy is mapping and the use of other various graphic organizers (Katims & Harmon, 2000).

When teachers use graphic organizers with special-needs students, they have the opportunity to create an instructional design environment that capitalizes on the "big

idea," which is defined as a concept or principal that heightens knowledge acquisition while unlocking content-area information for the broad range of diverse learners found in schools (Kameenui & Carnine, 1998, as cited in Guastello, 2000). Therefore, it seems appropriate to use different forms of graphic organizers as an instructional strategy for low achievers, particularly with respect to their potential lack of prior knowledge brought to content topics and with a need to strengthen their memory processing (Guastello, 2000).

The number of students with disabilities being educated in general education classrooms has increased substantially since the late 1980s (McLesky, Henry & Hodges, 1998). This inclusion is having a significant effect on the way teachers educate students in general education classrooms. Teachers need to pick and choose from a variety of strategies and accommodations to meet the needs of all students (Wallace & West, 1998). Addressing the educational needs of students with learning disabilities appropriately in general education classrooms is a challenge. One aspect of helping students with disabilities become successful in integrated settings is the use of instructional adaptations that facilitate student learning (Fisher & Schumaker, 1995; Scott & Vitale 1998). One meaningful instructional tool that leads to modifying and adapting classroom learning is the use of visual illustrations and spatial strategies (Ostoits, 1999).

Researchers and practitioners have studied the effects of using visual constructs and maps with classified students. It proved to be one of the more successful intervention strategies to help students comprehend text more effectively (Guastello, 2000). Many researchers focusing on interventions for students with special needs at the secondary

level have noted the importance of graphic organizers and other methods of identifying the most critical content for students to learn (Crawford & Carnine, 2000).

SUMMARY

Students who gain most from graphic organizers may be those labeled as visual-spatial learners, who excel when provided with visual representations. These students may reject rote memorization and have a need to see how the parts relate to the whole before they can make sense of isolated ideas typically presented in lessons (Silverman, 1989, as cited in Kinchin, 2000). This suggests that for teachers to optimize their lessons, they must be familiar with the learning styles of their students.

All in all, it has been proven through many researchers and practitioners that graphic organizers are essential tools that work in many cases and situations. They can be used to enhance comprehension, as an aid to textbooks, and as a classroom tool that allows all types of students to organize and comprehend a variety of material and texts.

CURRENT INVESTIGATION

Literature supports the use of organizational strategies in complementing instruction for comprehension; however, there is limited research done dealing with the use of graphic organizers as an assessment tool. The present study investigated the use of graphic organizers as an assessment tool for seventh grade learning disabled students. It was anticipated that graphic organizers would be a more effective assessment tool for students with learning disabilities, compared to traditional methods of testing. In terms of using graphic organizers as a better assessment tool, I anticipated that they would be able to provide more of an opportunity for students to show what they have learned and

what they know because of the ease of physically putting it on paper. This form of assessment was intended to reflect greater student achievement because the emphasis was put on their knowledge and eliminated the excessive writing that may be present on traditionally styled tests. Graphic organizers have been successful in terms of extracting information, and therefore would serve as an affective way of assessing students.

METHOD

PARTICIPANTS AND SETTING

Sixteen classified students at Herbert Hoover Middle School were chosen from seventh grade resource rooms (Pull-Out program). There were nine males and seven females, ranging from 12 – 13 years of age. All students were from the lower middle socioeconomic class, and classified with a Specific Learning Disability (SLD). Of the 16 participants, three were African-Americans, five were Hispanic, and eight were Caucasian.

The 16 students were broken up into two groups, Group A and Group B, for the purpose of assessment. Depending on the week, each group was given either a traditional test or a graphic organizer assessment. In addition to alternating the method of assessment, the type of instruction was varied as well, switching on a weekly basis between linear notes and graphic organizer notes. The two groups were equalized on the basis of ability, and balanced in such a way that the means and variances of the groups were as nearly equal as possible. Therefore, it can be said that the groups were heterogeneous and matched. All instruction and assessment took place in the students' regular Language Arts classroom located in a northeast, suburban school district.

MATERIALS

Teacher created achievement tests were used to assess material that was taught to the students during the week. There were two forms of the test administered each week. One of the tests was in the traditional format, consisting of true/false, matching, fill in the blanks, and short answer types of questions. The other form of assessment was a graphic organizer created by the teacher. The text material the students were tested on included teacher selected short stories and trade books from the Seventh Grade Language Arts Curriculum. In addition, overheads and blackboards were used to visualize either the linear notes and outlines or graphic organizers. Photocopied worksheets of the graphic organizers were handed out to students.

PROCEDURE

During the first week, all students received comprehension instruction via graphic organizers. At the end of the week, the students were tested to assess their comprehension on the week's material. Group A was given a graphic organizer as an assessment, while Group B was given a traditional test.

For the second week, all students received comprehension instruction by way of outlines and other linear notes. At the end of the week, Group A took the traditional test, and Group B completed a graphic organizer as their assessment.

To ensure that all students were exposed to the different forms of assessment when instructed in both manners (with graphic organizers and linear notes), a schedule was devised for the eight weeks of this study.

Week	Method of Instruction	Assessment for Group A	Assessment for Group B
1	Graphic organizer	Graphic organizer	Linear notes
2	Linear notes	Linear notes	Graphic organizer
3	Graphic organizer	Linear notes	Graphic organizer
4	Linear notes	Graphic organizer	Linear notes
5	Graphic organizer	Graphic organizer	Linear notes
6	Linear notes	Linear notes	Graphic organizer
7	Graphic organizer	Linear notes	Graphic organizer
8	Linear notes	Graphic organizer	Linear notes

DATA ANALYSIS

Each week, tests were scored and recorded. Percentage increases and percentage decreases in group scores were noted and recorded. In addition, if there was no change in scores, they were noted as well. At the end of the eight weeks, results from the two groups were compared and contrasted based on the type of assessment, in combination with the type of instruction, to determine if there was an increase in achievement scores when a graphic organizer was used, as contrasted with a traditional test. Means were calculated for each condition. Statistical differences between means were calculated using Analysis of Variance (ANOVA).

RESULTS AND CONCLUSIONS

Two methods of teaching and two assessments were contrasted, meeting a total of four conditions. These conditions were: (1) graphic organizer instruction with graphic

organizer assessment, (2) graphic organizer instruction with traditional test, (3) linear notes instruction with graphic organizer assessment, and (4) linear notes instruction with a traditional test. My hypothesis stated that there would be a difference between the four conditions and one condition would be more effective than another.

Measures of central tendencies revealed there was a difference in the data as indicated in the chart below. On the surface, linear notes appeared to be a better method of teaching with a combined mean of 83.8 when compared to graphic organizer instruction, with a combined mean of 79.1. Furthermore, condition three, linear notes instruction with graphic organizer assessment, appeared to be the optimal assessment. Therefore, it would appear that the null hypothesis is rejected because several group means are not equal in the populations as indicated in the chart below. An ANOVA analysis was conducted to test the null hypothesis.

Statistics

		GO_GO	GO_TT	**LN_GO**	**LN_TT**
N	Valid	32	32	32	32
	Missing	0	0	0	0
Mean		78.8750	79.5625	**85.7188**	**81.9063**
Median		84.0000	79.0000	88.5000	88.0000
Mode		61.00	70.00	86.00	100.00
Std. Deviation		19.1155	13.2201	14.6381	17.4270
Minimum		32.00	40.00	39.00	38.00
Maximum		103.00	99.00	103.00	102.00

Further analysis indicated that the mean difference between graphic organizer and linear notes is not significant as shown in the table below. Therefore, the null hypothesis stands, several group means are equal.

ANOVA Table

		Sum of Squares	df	Mean Square	F	Sig.
GO_COMB * LN_COMB	Between (Combined) Groups	2701.802	19	142.200	.705	**.760**

In addition, the difference between graphic organizers and traditional tests in terms of assessment does not appear to be significant either, at the Alpha = .05 level of significance.

ANOVA Table

		Sum of Squares	df	Mean Square	F	Sig.
LN_GO * LN_TT	Between (Combined) Groups	4303.71	25	172.149	.442	**.930**

DISCUSSION

A possible explanation for the obtained results may be attributed to the population utilized in the study. Special needs students often differ in their educational needs from the general education students. If this study were conducted using general education students as the sample, perhaps there would be a significant difference between the four conditions. Likewise, if a larger sample was used, results may have been different.

While the findings of this study may have contradicted studies done with the general education population, it also went against other studies done with the middle school special education population. The null findings of this study were inconsistent with some other studies conducted in the past by those such as Gardill and Jitentra (1999), Katims and Harmon (2000), Ostoits (1999), Guastello (2000), and Crawford and Carnine (2000), that stated when using graphic organizers with middle school students with learning disabilities, comprehension increased. The results from this study were based on the performance of only sixteen students, and the study was only conducted for a duration of eight weeks. If the study were done over a longer period of time, with a larger sample, there possibly would be a difference in the findings. Perhaps in the future, a study similar to this could be replicated with more students over a longer period of time.

Overall, there seems to be advantages to both graphic organizers and traditional notes and tests. Using a combination of both to include novelty in the classroom may be beneficial and foster the development of comprehension.

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